



Stormwater flow has serious repercussions including endangerment of public health and altering the aquatic biology of a river or stream. WWETCO's technology helps to improve and protect water quality and the designated uses of these water bodies by controlling flow and removing contaminants flushed from the watershed.

WWETCO, LLC

Stormwater pollution can have many devastating effects on bodies of water, including high velocities and sediments that impact aquatic biology and elevated bacteria that can affect public health in recreation waters. When the Environmental Protection Agency (EPA) sought to address this growing issue, a local Georgia company accepted the challenge and cultivated a patented technology that is proving to stop the damaging runoff situation. WWETCO – short for Wet Weather Engineering and Technology – received a Phase I and subsequent Phase II SBIR grant through the EPA titled, Non-Mechanical Device for Stormwater Flow Control. The resulting technologies – WWETCO's FlexFilter™ and FlexFlow™ first implemented in Georgia are now being used within the states of Ohio, Missouri and Louisiana and broad possibilities exist nationwide in a variety of government and commercial applications.

PHASE III SUCCESS

\$9.9 million in commercial revenue resulting from various EPA grants and municipal installations

AGENCIES

EPA

SNAPSHOT

Through SBIR Phase I and II projects with the EPA and municipalities, WWETCO has developed stormwater treatment technologies that help to improve water quality and aquatic biology health in rivers and streams.

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Water quality standards and beneficial use designations are set by each state for all streams, rivers and lakes. When impairment is determined, a watershed analysis is conducted to define the cause and contributions that must be remedied to bring the water body into compliance.

"This process is defined as a TMDL allocation under the Clean Water Act," explains Mark Boner of WWETCO. "As watersheds become more impervious with urbanization, the runoff volumes and velocities increase and cause exponentially greater erosion and sediment in the water column. These cause the disruption of the natural habitat for indigenous organisms and thus stream impairment. Strategically placed flow attenuation in the watershed can reverse many of these impairments."

Aquatic biology populations are a measure of water body health. As Boner explains, macro-invertebrates are the primary food source for fish and when they are impaired, fish populations and diversity will also suffer.

"Bacteria and other contaminants build up on all types of land uses and are quickly flushed into the streams when it rains. Slowing runoff flow rates and filtering out eroded sediments and other contaminants will improve aquatic biology and protect public health."

WWETCO's technology platform is founded on the use of available energy in stormwater runoff to passively attenuate flow and filter out contaminants. The FlexFlow technology uses



a flexible engineered fabric holding a static water level and positioned above a conduit that creates a differential hydraulic pressure across the membrane to passively maintain an upstream water level during changing flow conditions. The design can seal the conduit or allow the passage of aquatic biology or other base flows during dry weather. During runoff conditions, the flexible membrane lifts upward only as needed to pass any excess volume or debris. WWETCO's flow technology can also be used to divert runoff to off-line treatment or to improve the operation of stormwater ponds or any project where an upstream water level is required to be maintained. The non-clogging aspect of the FlexFlow eliminates the need for routine cleaning or maintenance. Prior to this, conventional approaches included devices being placed in the flow path, which risk upstream flooding or less than optimal wet weather control.

Supplementing the flow technology is the FlexFilter – a high rate filtration system utilizing synthetic compressible media. This technology uses the available energy in the runoff to passively compress an engineered fabric against a compressible media bed, eliminating mechanically actuated internal components and providing for a tapered compression of the media. The FlexFilter is a simple gravity system requiring no moving parts. As the liquid flows onto the top of the media, the larger particles are trapped in the upper portions of the filter. As the liquid works its way down, the smaller particles are captured by the smaller pores. This porosity gradient within the filter bed provides for a more effective use of the entire media which allows for a higher mass load to the filter prior to the need for cleaning. The effluent from the FlexFilter is low in solids with small particles sizes amenable to UV disinfection.

Eager to put both technologies into practice, the City of Columbus, Georgia implemented a stormwater treatment system to control flow and filter the runoff from their seven-acre vehicle maintenance facility. This project was the first in a series of stormwater management measures to meet total maximum daily load regulations and stormwater permit requirements. The Columbus Water Works then implemented a stormwater treatment system to protect the downstream public health and improve aquatic biology in the city's Premier Park. This facility was funded by a \$0.9 million EPA 319(h) grant to evaluate treatment of urban stormwater runoff. The results were an 82% bacteria load reduction, which met the state of Georgia's TMDL allocation for that creek. There was also a 60-fold increase in macro invertebrates which propelled the stream from a Class C category to a Class A. The project won both a "Build America" and a "Build Georgia" award in 2008. It is also considered a success story under the EPA nonpoint source program.

The most recent WWETCO project is a 100 MGD combined sewer overflow (CSO) high rate treatment (HRT) FlexFilter. This facility is the size of an American football field and treats sewer overflows with an effluent that after its first 6-month operation, is producing secondary treatment criteria with an annual pollutant load reduction to the river by more than 90%. This facility was constructed at a cost of \$33 million, considerably lower than the competition, and with a smaller O&M cost. This facility also provides a dual function capability to polish the wastewater treatment plant effluent and controlling nutrient loads during dry weather periods. The CSO and other sanitary sewer overflow program is regulation driven and estimated at more than \$200 billion nationally.

"Nutrient control is another regulatory program that is coming to a city near you and the FlexFilter technology can be used for both wet weather and nutrient treatment," adds Boner.

With a handful of diverse installations under its belt, WWETCO attributes the SBIR program with helping the company take that initial step.

"It is very hard to get owners to go with something very new in the environmental business, even though it appears to have obvious benefits. Nobody wants to be serial #1," says Boner. "In our case, the SBIR program was the catalyst that got our technologies fleshed out and into the marketplace – it helps move innovation."